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Nos. 6, 12, and 17 obtainable only from the Arctic Institute.

*1. The Museum of Natural History, the University of Kansas. By E. R. Hall and Ann Murray. Pp. 1-16, illustrated. January 5, 1946.

*2. Handbook of Amphibians and Reptiles of Kansas. By Hobart M. Smith. Pp. 1-336, 233 figures in text. September 12, 1950.

3. In Memoriam, Charles Dean Bunker, 1870-1948. By E. Raymond Hall. Pp. 1-11, 1 figure in text. December 15, 1951.

*4. The University of Kansas, Natural History Reservation. By Henry S. Fitch. Pp. 1-38, 4 plates, 3 figures in text. February 20, 1952.

5. Prairie Chickens of Kansas. By Maurice F. Baker. Pp. 1-68, 4 plates, 15 figures in text. March 10, 1953.

6. The Barren Ground Caribou of Keewatin. By Francis Harper. Pp. 1-163, 28 figures. October 21, 1955. Copies, paper bound, $1.50 postpaid from the Arctic Institute of North America, 1530 P Street NW, Washington 5, D. C.

7. Handbook of Mammals of Kansas. By E. Raymond Hall. Pp. 1-303, illustrated. December 13, 1955. Paper bound, $1.50 postpaid (cloth $4.00).

8. Mammals of Northern Alaska, on the Arctic Slope. By James W. Bee and E. Raymond Hall. Pp. 1-309, Frontispiece colored, 4 plates, 127 figures in text. March 10, 1956. Paper bound $1.00 postpaid.

9. Handbook of Amphibians and Reptiles of Kansas. 2nd [revised] edition. By Hobart M. Smith. Pp. 1-356, 253 figures in text. April 20, 1956. Paper bound $1.50 postpaid (cloth $4.00).

*10. The Raccoon in Kansas. By Howard J. Stains. Pp. 1-76, 4 plates, 14 figures in text. July 6, 1956.

11. The Tree Squirrels of Kansas. By Robert L. Packard. Pp. 1-67, 2 plates, 10 figures in text. August 20, 1956.

12. The Mammals of Keewatin. By Francis Harper. Pp. 1-94, 6 plates, 8 figures in text, 1 map. October 26, 1956. Copies, paper bound, 75 cents postpaid from the Arctic Institute of North America, 1530 P Street NW, Washington 5, D. C.

13. Museum of Natural History . . . University of Kansas. By Roy R. Moore and E. R. Hall. Pp. 1-8, illustrated. June 1, 1957.

14. Vernacular Names for North American Mammals North of Mexico. By E. Raymond Hall, Sydney Anderson, J. Knox Jones, Jr., and Robert L. Packard. Pp. 1-16. June 19, 1957.

15. The Ecology of Bobwhites in South-central Kansas. By Thane S. Robinson. Pp. 1-84, 2 plates, 11 figures in text. September 6, 1957.

16. Natural History of the Prairie Dog in Kansas. By Ronald E. Smith. Pp. 1-36, 4 plates, 9 figures in text. June 17, 1958.

17. Birds of the Ungava Peninsula. By Francis Harper. Pp. 1-171, 6 plates, 26 maps. October 15, 1958. Paper bound, $2.00 postpaid from the Arctic Institute of North America, 1530 P Street NW, Washington 5, D. C.

18. Furbearers in Kansas: A Guide to Trapping. By Howard J. Stains and Rollin H. Baker. Pp. 1-100, illustrated. November 19, 1958. Paper bound, 50 cents postpaid.

19. Museum of Natural History . . . University of Kansas. By Roy R. Moore and E. R. Hall. Pp. 1-8, illustrated. May 29, 1959.

20. Handbook of Gastropods in Kansas. By A. Byron Leonard. Pp. 1-224, 11 plates, 87 figures in text. November 2, 1959. Paper bound $1.00 (cloth $2.00).

21. Management of Channel Catfish in Kansas. By Jackson Davis. Pp. 1-56, 8 figures in text. November 2, 1959.

22. Hand-list of the Birds of Kansas. By Richard F. Johnston. Pp. 1-6. May 7, 1960.

23. Directory to the Bird-life of Kansas. By Richard F. Johnston. Pp. 1-69, 1 figure. August 31, 1960.

* Out of print.

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Guide to the Panorama of North American Mammals

Museum of Natural History
The University of Kansas
MISCELLANEOUS PUB. 25

COMMENTARIES WRITTEN BY

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and staff members of the museum

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GENE COURTNEY

courtesy of Centron Corporation, Inc.

AUDIO-VISUAL EQUIPMENT BY

ARMSTRONG-TEMPLEMAN, INC.

Abilene, Kansas

DECEMBER 15, 1960

Designed and printed in the State Printing Plant, Topeka

JAN – 7 1963

Entering the Museum

Mounting the outside steps of the Museum of Natural History the visitor enters the foyer. Directly ahead (west) a 16-foot-wide corridor leads into the Panorama of North American Mammals. Whoever enters the corridor trips the beam of an electric eye. It shines a light on a large map of North America and sets in motion a plastic tape. The message on the tape, by way of a loud-speaker, requests the visitor to

> "pause here a moment, please—and note on the wall panel to your right the Guide to the Panorama of North American mammals. The small painting in the upper left-hand corner of the panel depicts the mammalian life in the Arctic Life-zone, and has a line leading to a locality in the Arctic. The paintings below this and their guide lines direct your attention to other life-zones. At the bottom of the right-hand column is a painting of the Tropical Life-zone. These are the life-zones through which a person would pass in going from the North Pole southward to the Equator. Now, if you will pass to the right side of the curtain you will see first the Arctic Life-zone and then successively more southern life-zones. Thank you."

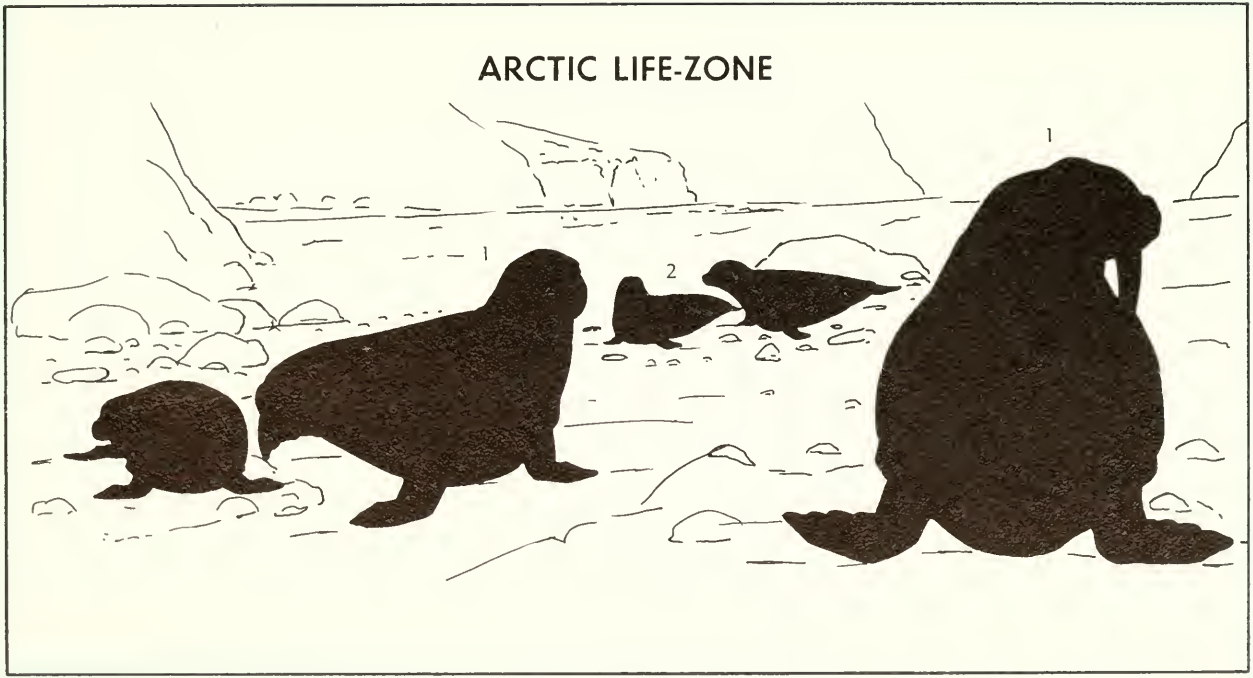
Telephones in front of each major section of the Panorama enable visitors (who press the white button beside the phones) to hear spoken commentaries while viewing the displays. These commentaries are reproduced on the following pages.

VISITING HOURS
Week Days
9:00 a. m. to 5 p. m.
Sundays and Holidays
1:30 p. m. to 5 p. m.

Museum of Natural History,
Miscel. Publ. No. [redacted]25
5M—December 15, 1960

Arctic Life-zone. On the northernmost shores of North America and on the larger arctic islands huge glaciers wind down to the sea as shown in the painting on the background. Massive sections of ice give way, crash into the sea and form icebergs of gigantic proportions. The area depicted is so far north that summer lasts only a few weeks. Consequently few plants grow there. By means of his strong lips and greatly enlarged upper canine teeth that have developed into tusks of densest ivory, the walrus rakes clams and other animals that he eats from their places of attachment on the shallow seabottom. An old bull can weigh 3,000 pounds or more. A thick layer of blubber—fatty tissue beneath the skin—effectively insulates the walrus against the chill of the arctic waters in which he lives. For most of the year he is away from land and lives at the edge of the arctic pack-ice, where whole herds of walruses climb out of the water and rest on the ice.

The distinctively marked harp seal in the background bears also the name ice seal because it lives on and around the ice floes for most of the year. Even the young are born on the ice floes. Only in the brief summer, and then but rarely, do harp seals rest upon the rocky shores of the Arctic Ocean. Fish and smaller animals that live in the ocean are eaten by the harp seal.



. WALRUS
Rosmarus rasmarus
. HARP SEAL
Phoca groenlandica

Arctic Life-zone. The polar bear swims and dives nearly as well as do the seals. He may climb on an iceberg and go voyaging on drifting ice floating scores of miles on the polar current, feeding on seals obtained from the surrounding ice floes. On snow and ice he can walk noiselessly; his claws are muffled by fur on the soles of his feet. This noiseless tread enables the polar bear to surprise and catch basking seals. A trait of playfulness, evident even in adults, is depicted here in the two polar bears boxing one another. Young early learn to swim with skill and ease. The gray seal and the smaller harbor seals in the foreground of the display are associates of the polar bear. Farther inland the muskox lives in herds and feeds on lichens and other low-growing plants. The muskox is a member of the cow family and there has been considerable discussion of late about attempting to domesticate the muskox so that it will be useful to man in the Arctic Region in the same way that cattle are useful to man in the Temperate Region.

ARCTIC LIFE-ZONE

Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

1. MUSKOX
Ovibos maschatus

2. POLAR BEAR
Thalarctos maritimus

3. HARBOR SEAL
Phoca vitulina

4. GRAY SEAL
Halichoerus grypus

Arctic Life-zone. Here where the tundra of the Arctic Life-zone meets the dwarfed, northernmost spruce trees of the Hudsonian Life-zone, frost in late autumn has yellowed the tundra's prostrate willows and reddened the ankle-high birch. The earth is solidly frozen hundreds of feet deep; only the top six to eight inches of the tundra thaws out in summer. Throughout much of the brief summer—hardly two months long—the sun shines 24 hours a day and plant growth is correspondingly rapid. Mosses, lichens, and other low-growing plants provide an abundant ground cover that yields beneath a person's tread as would a half dozen Turkish rugs stacked one on another. There are no trees and consequently no tree-living mammals—for example, there are no tree squirrels. Because the ground is frozen, burrowing mammals are at a disadvantage. Only a few kinds of land mammals live there.

Fluctuation in number of individuals in each of several species is great—greater than in the Temperate Life-zone, and much greater than in the Tropical Life-zone. For example, the brown lemmings gradually build up in numbers over a three-year period and then die off in a month or so, leaving only a fraction of one per cent of the population. A commonly held belief is that when they become numerous the lemmings migrate to the sea and swim out to their death in the icy water. The facts are that they sometimes do migrate and if the migration is toward the adjacent ocean they continue on into the water, but as often as not they migrate in another direction and the dense population then is reduced by starvation, natural enemies, and disease instead of by drowning.

A much larger animal that also depends upon the plant growth for its food is the Caribou. It is the New World variety of the animal termed Reindeer in northern Europe. Caribou are especially fond of the grasslike sedges in summer but in winter depend upon lichens, which grow in profusion on the tundra.

The large mammal on the cliffs is the white sheep also referred to as Dall's Mountain Sheep. The loose spiral of the horns causes them to look as though someone had taken hold of the tips and pulled them outward a little. The Rocky Mountain Bighorn, shown in the Canadian Life-zone, has horns that grow in a tighter spiral.

ARCTIC LIFE-ZONE

FOREGROUND COURTESY OF DR. H. L. REGIER

Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

1. WOLVERINE
   Gula luscus
2. DALL'S SHEEP
   Ovis dalli
3. GREENLAND CARIBOU
   Rangifer tarandus
4. BROWN LEMMING
   Lemmus trimucronatus
5. MUSKOX
   Ovibos moschatus
6. COLLARED LEMMING
   Dicrostonyx groenlandicus

Hudsonian Life-zone. South of the arctic tundra the first belt of timber—technically termed the Hudsonian Life-zone—has more soil, and more humus in the soil. Mosses outnumber lichens. The caribou extends into this life-zone but here it is of a different kind, or, to speak more exactly, of a different subspecies. It is the woodland caribou having smaller antlers than the caribou of the tundra. Caribou, you probably know, differ from all of the other kinds of the deer family in that both females and males possess antlers. In other kinds of deer, only males have antlers. In the caribou the brow tines are especially well-developed; they are flattened and are said to be useful in scraping away the snow so that the caribou can get at his favorite plant food on the ground. The caribou has large hooves. Also, the dewclaws, or smaller pair of hooves behind the larger pair, are so situated as to bear a part of the animal's weight. Consequently caribou walk over muskegs and soft boggy ground where animals of equal weight having smaller feet would sink in and be unable to walk at all.

Ahead of the caribou is the snowshoe rabbit. By means of its exceptionally large hind feet, it travels on soft, new-fallen snow and thinly crusted snow where a pursuing enemy like the lynx or wolf sinks deeply at every bound and lags behind. In winter the white coat of the snowshoe rabbit blends well with its surroundings. As shown here, shortly before snow has fallen, the white coat is conspicuous and seems to have attracted the attention of the lynx crouched on the ledge above. In summer the snowshoe rabbits have brown coats that blend with their surroundings.

HUDSONIAN LIFE-ZONE

FOREGROUND COURTESY OF WYANDOTTE HIGH SCHOOL SCIENCE FIELD CLUB, WALLACE M. GOOD, SPONSOR

1. LYNX
   Lynx canadensis
2. SNOWSHOE RABBIT
   Lepus americanus
3. WOODLAND CARIBOU
   Rangifer tarandus
4. CLARK'S NUTCRACKER
   Nucifraga columbiana

5. PAPER BIRCH
   Betula papyrifera
6. MOSSES
7. BLACK SPRUCE
   Picea mariana
8. BOG WILLOW
   Salix pedicellaris

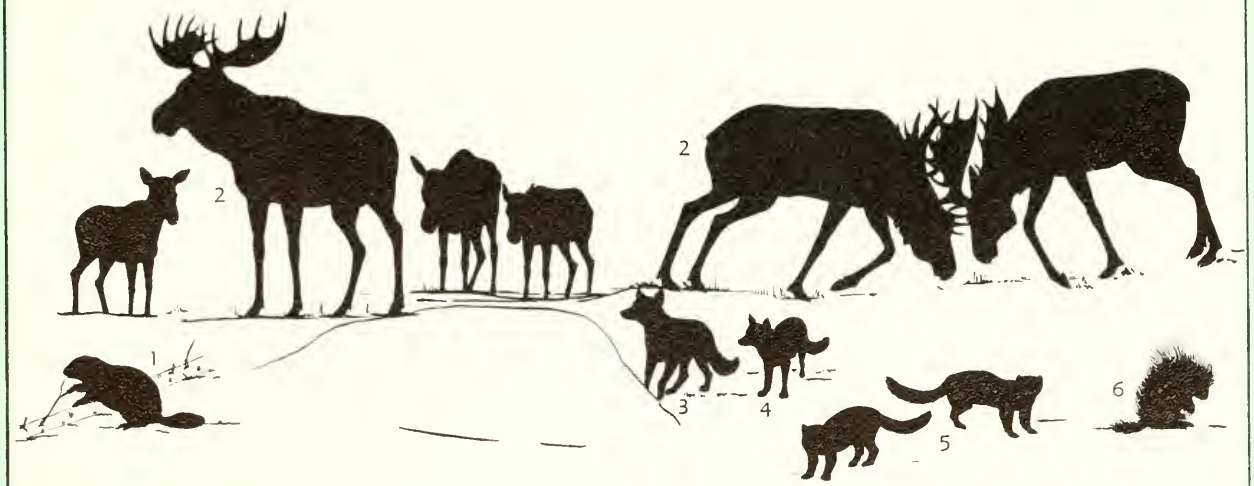
Canadian Life-zone. Rich in variety of coniferous evergreen trees, the Canadian Life-zone extends in a broad belt from the Atlantic to the Pacific and southward down the Rocky Mountains of North America. Along the eastern side of the mountains in northern British Columbia the visitor finds animal and plant life much as shown here. The moose, largest living member of the deer family, is a forest-loving animal. Its fleshy, bulbous, prehensile muzzle is an aid to grazing on tender-stemmed aquatic plants that grow on the bottoms of shallow lakes. In winter the moose browses tender twigs and boughs of trees. The huge, palmate antlers are well shown in the two fighting bulls.

High in the background (see p. 17) are the bighorns or mountain sheep and to their right the mountain goats (p. 15) that range from Alaska to Idaho and Montana.

The fisher, in the right foreground, is a large member of the weasel family—a relative of the marten. The fisher preys on mice and red squirrels but especially on the porcupine and has more nearly mastered the technique of avoiding serious injury from the sharp quills of the porcupine than has any other carnivore. The fisher is important in maintaining nature's balance by keeping the numbers of porcupines in bounds. The porcupine, protected by his spines, is one of the most fearless of our wild animals. Because he can be closely approached by man, it is customary in the north woods never to kill a porcupine needlessly. He is the one wild animal that a starving man, unarmed and lost in the north woods, might obtain for food.

The silver fox and cross fox in the right-hand part of the Canadian Life-zone are mere color phases of the one species best known in the red phase and rarely in the black phase; all four color phases can occur in the offspring of a single pair of parents.

CANADIAN LIFE-ZONE



1. **BEAVER**
   Castor canadensis
2. **MOOSE**
   Alces alces
3. **CROSS FOX**
   Vulpes fulva
4. **SILVER FOX**
   Vulpes fulva
5. **FISHER**
   Martes pennanti
6. **PORCUPINE**
   Erethizon dorsatum

Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

Canadian Life-zone. The formation of a beaver pond in a small stream raises the water level in the stream and also in the nearby ground. As a result certain trees within the area die. Their limbs soon break and fall from the dead trunks and allow the entrance of moisture and fungi that hasten the enlargement of cavities formed by the breaking off of limbs. Woodpeckers drill other holes in the dead trunks. These holes provide essential nesting sites for tree swallows, crested flycatchers, bluebirds, titmice, wood ducks and other birds. Wood-boring insects multiply and provide food attractive to several birds and other animals. Because of the higher water table and formation of swampy land, cottonwoods, willows and a variety of other plants spring up. In such an area, water birds, muskrats, the mink, the otter, and a host of other kinds of animals find their preferred habitat, created by the work of the beaver. Fish of several kinds find rearing ponds adapted to their special requirements. In the short period of even 10 years beavers can tremendously alter a habitat and the character of its plant and animal life.

. GRIZZLY BEAR
Ursus horribilis

. WHITE-TAILED DEER
Doma virginiana

. AMERICAN BITTERN
Botaurus lentiginosus

. BEAVER
Castor canadensis

. MOUNTAIN GOAT
Oreamnos americanus

. MOOSE
Alces alces

CANADIAN LIFE-ZONE

WATERFOWL IN SKY ABOVE BEAVER POND COURTESY OF FLOYD T. AMSDEN

Transition and Canadian life-zones. When White Man first arrived in the Yellow Pine Country, the Transition Life-zone, a prominent large mammal was the wapiti or so-called elk. Great bands of wapiti ranged through the yellow pine forest and on the adjacent plains. The magnificent antlers shown on the mounted male are near record size.

Beavers, at the right side of the pool, also inhabit the Transition Life-zone as well as adjoining life-zones. In Kansas most beavers live in burrows in banks instead of in houses like the one shown in the pool. Not all do so, however. To provide and maintain a depth of water sufficient for their needs the beavers in small streams, and sometimes in wide streams, work assiduously at arranging small poles and sticks to form dams. Faced with mud on the upstream side, a dam raises the water level. In addition to providing refuge for the beavers and a covering for the entrance to the burrow or lodge, a pond serves as a waterway up and down which beavers travel and transport freshly cut limbs and other parts of the trees that they cut for food. The beaver, you probably know, eats principally the tender inner bark of limbs and trunks of trees. Also, the pond is a place in which the beavers store food and move about below the ice in winter.

TRANSITION AND CANADIAN LIFE-ZONES

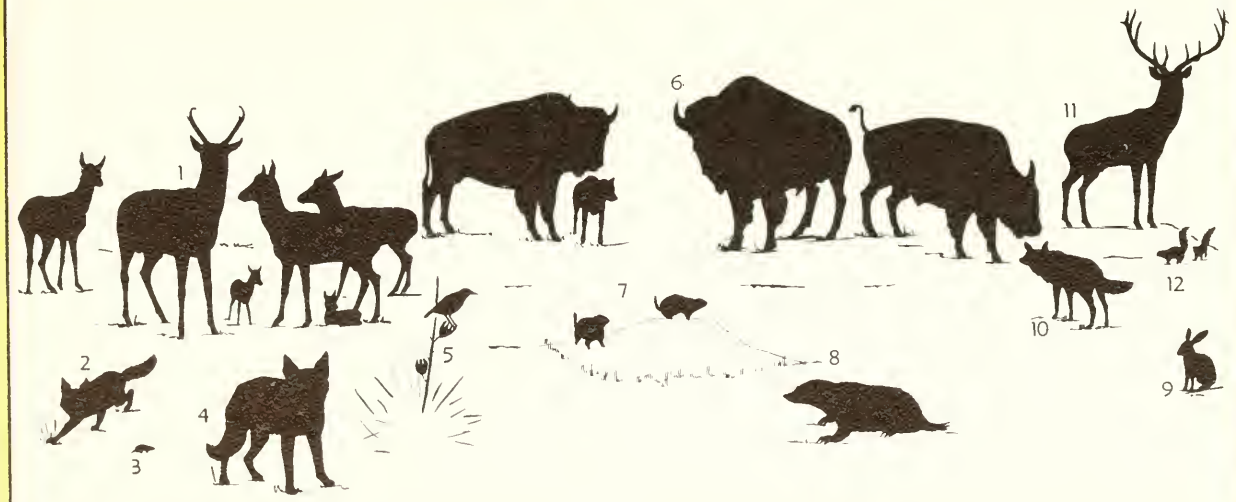
1. WAPITI
   Cervus canadensis
2. MINK
   Mustela visan
3. RIVER OTTER
   Lutra canadensis
4. MULE DEER
   Dama hemionus
5. MOUNTAIN SHEEP
   Ovis canadensis
6. GRIZZLY BEAR
   Ursus horribilis

MOST LARGE MAMMALS IN THIS PANORAMA WERE COLLECTED AND MOUNTED BY THE LATE PROFESSOR L. L. DYCHE

Sonoran Province of Upper Austral Life-zone. Here in the Sonoran Province of the Upper Austral Life-zone is a section of the Great Plains that could be in northeastern Colorado. This section merits careful study by persons interested in conditions of a century ago, because the exhibit was made by men who saw the Great Plains before the larger animals were eliminated by the plow, by fencing, and by pasturing. Now, vast wheat fields in moist years and dust bowls in dry years take the place of much of the prairie sod, and cattle take the place of the countless thousands of bison and most of the large native mammals associated with him. Even the smaller kit fox, white-tailed jack rabbit, and prairie dog maintain only token populations in a few places.

The prairie dog, really a large ground squirrel, peers from the mouth of his burrow to see that no sly coyote lurks near enough to catch him. The badger is a more formidable enemy that literally digs the prairie dog out of his burrow. The raised mound of earth around the mouth of the prairie dog's burrow protects him from flooding when rain comes to the level prairie. When the grass grows tall, the prairie dogs disappear; perhaps many then are caught by their natural enemies or perhaps they literally move out. Be that as it may, they prefer short grass prairie. In the belief that the prairie dogs were harmful, cattle men and sheep men destroyed them at every opportunity and in late years encouraged organized destruction by means of poisoned grain and by pumping exhaust fumes from tail pipes of autos into burrow systems. Stock men who overgrazed their ranges were especially active in promoting destruction of the prairie dog. Consequently, it has been exterminated over much of its original range in Kansas. Actually, unless the range is overgrazed, there is sufficient food for both the prairie dogs and domestic livestock. Early observers noted that in some places the vast towns of prairie dogs gradually and slowly moved across the plains. It was also noted that the grass grew higher and thicker behind than in front of the town. Air and water entered the ground through the prairie dog burrows at the deserted end of the town, enriched the soil and caused the better growth of grass. On the prairie where the grass is naturally short, the prairie dog is a desirable citizen because he contributes on a long-term basis to enriching the soil and thus provides a more abundant growth of forage both for the domestic livestock and native wildlife, including himself.

UPPER AUSTRAL LIFE-ZONE (SONORAN PROVINCE)



Foreground by George P. Young — Background by Som. T. Dickenson
(ossisted by students)

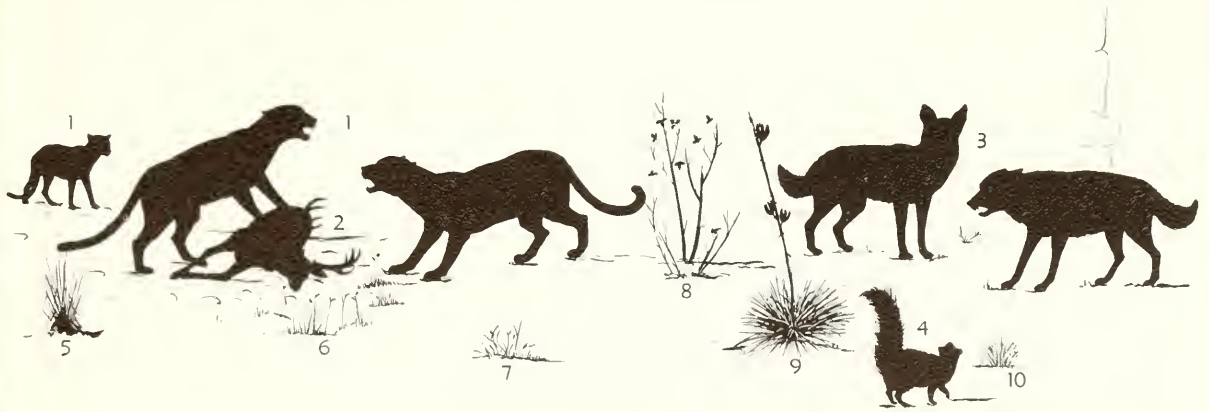
1. PRONGHORN
Antilocapra americana
2. SWIFT FOX
Vulpes velax
3. PRAIRIE VOLE
Microtus ochrogaster
4. COYOTE
Canis latrans
5. WESTERN MEADOWLARK
Sturnella neglecta
6. BISON
Bison bison
7. BLACK-TAILED PRAIRIE DOG
Cynomys ludovicianus
8. BADGER
Taxidea taxus
9. BLACK-TAILED JACK RABBIT
Lepus calilarnicus
10. GRAY WOLF
Canis lupus
11. WAPITI
Cervus canadensis
12. STRIPED SKUNK
Mephitis mephitis

Upper Austral Life-zone. Depicted here is another section of the Upper Austral Life-zone. The place is along Hackberry Creek near the boundary between Gove and Trego counties in western Kansas. At the turn of the century, Professor L. L. Dyche, assisted by Charles D. Bunker and Leverett A. Adams, made plaster of Paris molds of the face of the cliff of Cretaceous rocks. Here in the Museum they made the cast that you see and placed in front of it the native mammals found there as late as 1880. The mountain lion that here has killed a mule deer, and the gray wolves nearby, no longer occur on our plains. Mountain lion cubs that have been caught and reared have varied much in temperament. Although a few proved unreliable as pets, many were wholly satisfactory. The Cheyenne Indians of the western plains are said to have reared cub mountain lions and used them when adult for hunting.

Colors of many kinds of mammals, like that of the gray wolf, blend with the color of the background and cause the mammals to be inconspicuous. The wolf's unfriendly contemplation of the striped skunk points up a different type of animal coloration. The skunk's eye-catching black and white pattern can be recognized readily and other mammals who have learned, by experience, of the skunk's powerful chemical weapon rarely disturb him. The pattern is thus of advantage to the skunk for it protects him from large carnivores who otherwise might make a meal of him, and ready recognition of the skunk saves the carnivore from an unpleasant experience. If the skunk tends to be a bit on the independent side, he is basically a reasonable chap who almost never fires his chemical weapon except when attacked.

UPPER AUSTRAL LIFE-ZONE

MOST LARGE MAMMALS IN THIS PANORAMA WERE COLLECTED AND MOUNTED BY THE LATE PROFESSOR L. L. DYCHE



Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

. MOUNTAIN LION
Felis concolor

. MULE DEER
Dama hemionus

. GRAY WOLF
Canis lupus

. STRIPED SKUNK
Mephitis mephitis

. BIG BLUESTEM
Andropogon furcatus

6. BLUE GRAMA
Bouteloua gracilis

7 BUFFALO GRASS
Buchloe dactyloides

8. FRAGRANT SUMAC
Rhus aromatica

9. SMALL SOAPWEED
Yucca glauca

10 BROOM-SNAKEROOT
Xanthocephalum sarothrae

Upper Austral Life-zone. The buffalo grass, the blue grama grass, and the clumps of little bluestem grass here, are characteristic of the short-grass prairie. Responsible landowners who preserve prairie seem to feel that a checkerboard pattern can be achieved whereby fields of native prairie alternate with cultivated fields of wheat and milo to make for man himself a safer and better living place than is an area in which all of the land is cultivated. History teaches us that around large cities where every last bit of land was cultivated or intensively grazed, thereby extirpating the native wildlife, a slight change, climatically or sociologically, has not only made conditions unfavorable for man but in some places has annihilated him completely. Mute evidence to this effect is found by today's explorer who walks over the shifting sands of northern Africa or central Asia, noting here and there a remnant of some man-made structure of happier times. In contrast, our retention of native prairie for future years preserves samples of the uniquely American plants and animals such as the prong-horned antelope, badger, and swift fox. These prairie areas are the outdoor laboratories for scientific research, that is to say, practical study and understanding of the effects of native plants and animals upon the soil and upon each other; these areas are yardsticks for measuring effects on our land of our cultivation of crops and our grazing of domestic livestock, and reveal for mankind the means of insuring more nearly everlasting life instead of extinction. Men should think carefully before breaking up the remaining prairie sod.

UPPER AUSTRAL LIFE-ZONE (SONORAN PROVINCE)

LITTLE BLUESTEM
Andropogon scaparius

FRAGRANT SUMAC
Rhus aromatica

SMALL SOAPWEED
Yucca glauca

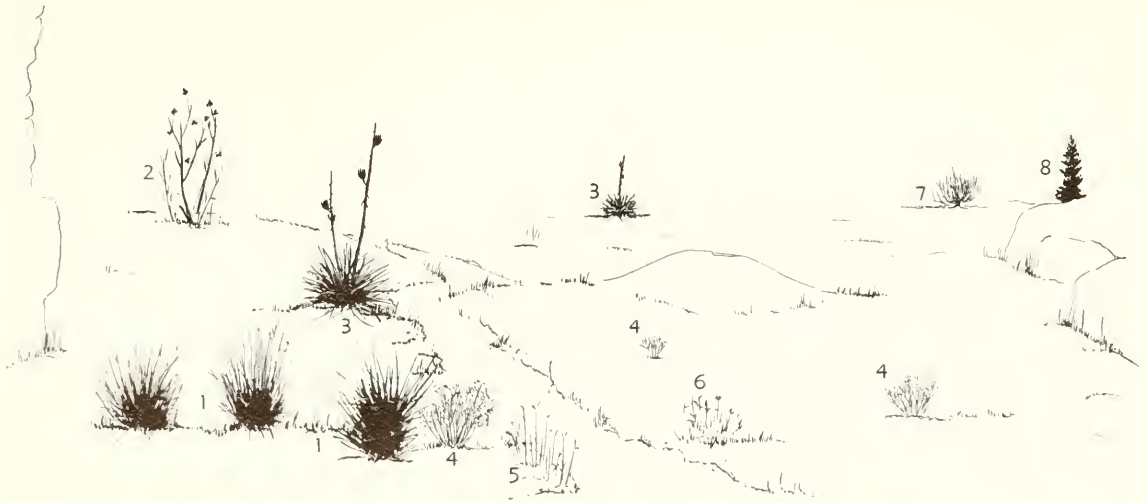
BROOM-SNAKEROOT
Xanthocephalum sarathrae

BLUE GRAMA
Bautelaua gracilis

BUFFALO GRASS
Buchlae dactyloides

SANDHILL SAGE
Artemisia filifolia

WESTERN JUNIPER
Juniperus scapularum



Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

Austral Province of Upper Austral Life-zone. The exact locale of this autumn scene in the Austral Province of the Upper Austral Life-zone is seven miles southwest of Lawrence but could be duplicated at hundreds of places in eastern Kansas. The north and south position is almost the same as that of the preceding scene of western Kansas but the rainfall averages approximately 35 inches instead of 15 as in western Kansas, which accounts for the difference in kinds and bulk of plant growth. The animal life shown is about as it was when White Man first saw the area; he extirpated the mountain lion and black bear. This fine adult male bear has accumulated much fat and in a month or so will seek out a cave in the rocky ledge or hollow out a bed in the tangle of vines and sleep the winter through. Contrary to popular belief, bears do not actually hibernate. Any slight disturbance awakens the bear. An animal that truly hibernates becomes torpid because of a lowering of the body temperature, a lowering of the rate of breathing, and a lowering of the pulse rate; some minutes of warming up are required to bring a hibernating mammal back to a state of wakefulness.

The woodchuck at the mouth of his burrow at the base of the tree actually does hibernate. He digs his own burrow, which ordinarily has more than one entrance, and a nest chamber well below the frost line. One woodchuck makes more than one burrow in a lifetime. Burrows made by the woodchuck are the homes or retreats of the opossum, cottontail, striped skunk, spotted skunk, red fox and other mammals. Truly the woodchuck is the homemaker for many other kinds of mammals.

In the left foreground the cottontail has been scented by the long-tailed weasel behind her and unless her keen sense of hearing warns her in time she is likely to make the weasel's next meal. In a field where small rodents are so abundant as to damage cultivated crops the weasel is the farmer's best friend.

UPPER AUSTRAL LIFE-ZONE (AUSTRAL PROVINCE)

Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

1. FOX SQUIRREL
Sciurus niger
2. EASTERN COTTONTAIL
Sylvilagus floridanus
3. LONG-TAILED WEASEL
Mustela frenata
4. RED FOX
Vulpes fulva
5. OPOSSUM
Didelphis marsupialis
6. THREE-TOED BOX TURTLE
Terrapene carolina
7. GRAY FOX
Urocyan cinereoargenteus

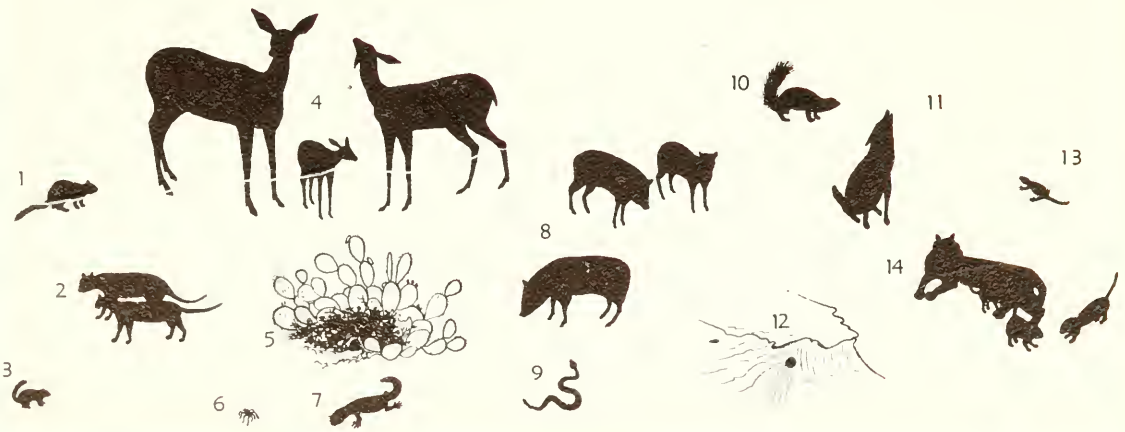
8. BOBCAT
Lynx rufus
9. BLACK BEAR
Ursus americanus
10. CARDINAL
Richmondena cardinalis
11. MOUNTAIN LION
Felis cancalar
12. EASTERN SPOTTED SKUNK
Spilogale putarius
13. WOODCHUCK
Marmota manax
14. RACCOON
Procyan lotor

Lower Austral Life-zone. Here is the Sonoran Province of the Lower Austral Life-zone along the United States-Mexican border. The view shown depicts what a visitor to the Saguaro National Monument, 16½ miles east of Tucson, Arizona, might see five minutes after sunrise in the third week of April, looking toward the Santa Catalina Mountains in the background. Of course, not all of the mammals are likely to be seen at any one time but all are native to the area.

Saguaro National Monument is administered by the United States National Park Service and the area was set aside for protection in order to preserve both natural conditions and naturally occurring changes as White Man found them when he first came on the scene a few hundred years ago. From established travelways through the forest of giant saguaros, a visitor can see every stage in the growth of these and associated cactuses. Gila woodpeckers carve out nest holes in the giant saguaros. Abandoned holes are used by elf owls and several other kinds of birds. The sap of the saguaro hardens in such a hole and forms a flasklike structure that persists long after the saguaro cactus plant has died and fallen apart. One of these flasks is on the ground at the feet of the mule deer.

In a desert area like this, a visitor may wonder where the food comes from to feed the hosts of kangaroo rats, pocket mice, and other small, seed-eating mammals that live in the daytime beneath the hot surface of the sand. Residents of the area know that in an occasional spring enough rain falls to sprout the seeds that have lain dormant, in some places for years, and then this sandy waste becomes a flower garden. Persons drive hundreds of miles to see the profusion of blossoms, so great as almost to conceal the ground and great is the number of seeds that grow, mature, and fall into the sand to await the moisture that may not come again for three years or more. There in the sand lie buried the seeds that support the kangaroo rats and other small mammals that have noses keen enough to find such food.

LOWER AUSTRAL LIFE–ZONE (SONORAN PROVINCE)



Foreground by George P. Young — Background by Sam. T. Dickenson
(assisted by students)

OCK SQUIRREL
permaphilus variegatus

CELOT
elis pardalis

ARRIS GROUND SQUIRREL
mmospermophilus harrisii

ULE DEER
docoileus hemionus

OUSE OF WHITE-THROATED
VOOD RAT
eotoma albigula

ARANTULA
ugesiella hentzi

ILA MONSTER
eloderma suspectum

8 COLLARED PECCARY
Pecari tajacu

9 WESTERN DIAMOND-BACKED RATTLESNAKE
Crotalus atrox

10 SPOTTED SKUNK
Spilogale gracilis

11 COYOTE
Canis latrans

12 BURROW OF BANNER-TAILED KANGAROO RAT
Dipodamys spectabilis

13 NORTHERN CHUCKWALLA
Sauromalus obesus

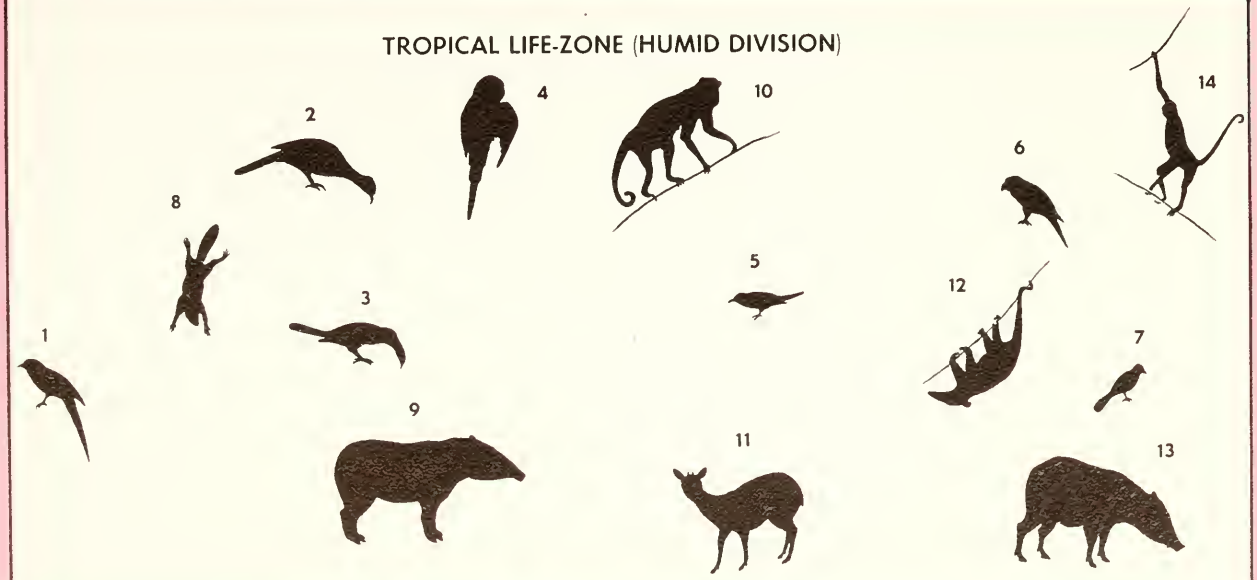
14 MOUNTAIN LION
Felis concolor

Tropical Life-zone. In the lower Tropical Life-zone, the temperature remains about the same the year around and distinct seasons are lacking. Night and day are of about the same length. Dawn is brief and so is the evening period of twilight because the sun rises and sets nearly at a right angle with the horizon. Owing to shifts in the trade winds, there are dry periods and wet periods within each year. This scene depicts the tropical forest of Central America in a dry period. Buttressed roots of the large trees and the stiltlike roots of the palm tell the experienced woodsman that he is in the tropics.

An anteater climbs head foremost down a vine. In the nearby sapling the flint-hard outer covering of the termite nest can chip the blade of an axe but yields to the strong foreclaws of the anteater. Once he has slit the hard covering of the nest, the anteater inserts his long tongue to drag out and consume the luckless termites.

An eminent botanist has said that it is easier to find a hundred different kinds of trees in the tropics than it is to find a hundred of the same kind. This variety and abundance of plant life creates many habitats for animals. The treetops, for example, shelter kinds of birds, mammals, and insects that live nowhere else. Other animals live in the lower trees, some others in the understory of brush, and still others only on the ground. Since the ground is never frozen, burrowing animals are common. Lakes and streams never freeze as in the arctic so there are many kinds of aquatic animals. The large number of places in which animals can live seems to be the cause of this great variety of animal life.

TROPICAL LIFE-ZONE (HUMID DIVISION)



GIFT OF ALFORD J. ROBINSON AND SHAWNEE SPORTSMEN, INC., 1953

BIRDS

UIRREL CUCKOO
aya cayana

RPLISH GUAN
enelape purpurascens

EL-BILLED TOUCAN
amphastas sulfuratus

D AND BLUE MACAW
ra macao

RIKE TANAGER
ania aurantius

UE-CROWNED PARROT
mazana farinosa

IMSON-COLLARED
NAGER
hlogathraupis sanguinolenta

MAMMALS

8. DEPPE SQUIRREL
Sciurus deppei

9. BAIRD TAPIR
Tapirella bairdii

10. MANTLED HOWLER
Alouatta palliata

11 BROCKET or FOREST DEER
Mazama sartorii

12. THREE-TOED ANTEATER
Tamandua tetradactyla

13 WHITE-LIPPED PECCARY
Tagassu pecari

14 SPIDER MONKEY
Ateles geoffroyi

Tropical Life-zone. To the right a giant tree is encircled by a beltlike growth of the strangler fig. The story of its life history is as follows: The brightly colored macaw on the branch overhead, or the howler monkey high up in the background, finds a fig, pauses to eat it in the fork of the big tree, and inadvertently drops a seed there. In the hot, humid atmosphere of the tropics this seed sprouts and sends earthward a slender rootlet that in a month's time reaches the ground and then sends up a shoot, the tip of which searches for support and finds the trunk of a tree. In 10 to 12 years that strangler fig has grown to the proportions shown here and has formed a broad belt around the big tree and is sending flat growths of vine upward to repeat the encircling process at higher levels. Given 10 years more the strangler fig will have completely covered the huge trunk of the tree and some of its limbs, literally strangling it. The big tree decays and there is left standing only the exterior made up of the strangler fig having the outward shape of a tree. In time, weakened by the loss of its central support that has decayed, the strangler fig gives way in the face of a tropical hurricane and crashes to earth, leaving a gaping hole in the forest. Then trees of other kinds spring up and grow, and when another strangler fig attaches itself to one of these the cycle of life is started over again.

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TROPICAL LIFE-ZONE (HUMID DIVISION)

Foreground by George P. Young — Background by Sam T. Dickenson
(assisted by students)

1. SOAPBERRY
Paullinia turbacensis
2. PASSION FLOWER
Passiflora vitifolia
3. PALM
Palmae?
4. WILD YAM
Diascarea urophylla
5. MONSTERA VINE
Manstera sp.
6. RED PHILODENDRON
Philodendron sanguineum
7. MEXICAN FIG
Ficus crassiuscula
8. MEXICAN FIG
Ficus invaluta
9. DILLENIA FAMILY
Tetracera valubilis
10. CYCAD
Dioon spinulosum
11. CACAO FAMILY
Theobroma purpureum
12. BLUE MORPHO BUTTERFLY
Morpha cyprius
13. BLOODROOT FAMILY
Xiphidium coeruleum
14. MYRTLE FAMILY
Myrtaceae
15. CHINABERRY FAMILY
Guarea guara
16. SOCRATE PALM
Socratea durissima
17. ARROWROOT
Ischnosiphon pruinosus
18. PHILODENDRON
Philodendron sp.
19. ACANTHUS FAMILY
Acanthaceae
20. UNDERWOOD FERN
Stenochlaena vestita
21. SPIKE MOSS
Selaginella sp.
22. VELVET BEAN
Mucuna sp.
23. PANAMA PHILODENDRON
Philodendron panamense
24. PALM
Acanthorrhiza warscewiczii
25. PALM
Acanthorrhiza warscewiczii
26. MAIDENHAIR FERN
Adiantum lucidum
27. BROADLEAF NETTLE
Helicastylis latifolia
28. NEST OF TERMITE
Nasutitermes
29. BROMELIAD
Tillandsia sp.
30. HEART-LEAVED PHILODENDRON
Philodendron cordatum
31. WALL FERN
Polypodium crassifolium
32. MEXICAN FIG
Ficus invaluta
33. GINGER FAMILY
Renealmia cernua
34. CYCAD
Dioon edule